

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 13

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHANN ALSMEIER GEORGE R. GOTH, MAX G. LEVY,
VICTOR R. NASTASI, JAMES A. O'NEILL and PAUL C. PARRIES

Appeal No. 2000-1590
Application 09/130,226

ON BRIEF

Before JERRY SMITH, GROSS and BARRY, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1-10, which constitute all the claims in the application.

The disclosed invention pertains to a method of manufacturing a semiconductor trench device which has improved control over the threshold voltage of a deep trench corner of the device.

Representative claim 1 is reproduced as follows:

1. A method of manufacturing a semiconductor trench device comprising:

forming a dielectric on a substrate, said dielectric having an underlying oxide layer adjacent said substrate;

etching a trench in said dielectric and said substrate;

forming a recess in said underlying oxide layer;

filling said recess with a nitride plug;

filling said trench with a conductive material; and

oxidizing said dielectric and said conductive material, wherein said nitride plug controls a shape of a trench corner of said trench.

The examiner relies on the following references:

Fulton et al. (Fulton)	4,666,556	May 19, 1987
Koike et al. (Koike)	5,578,518	Nov. 26, 1996
Gardner et al. (Gardner)	5,891,787	Apr. 06, 1999
		(filed Sep. 04, 1997)

Claims 1-10 stand rejected under 35 U.S.C. § 103. As evidence of obviousness the examiner offers Koike in view of Fulton and Gardner.

Rather than repeat the arguments of appellants or the examiner, we make reference to the brief and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejection advanced by the examiner and the evidence of obviousness relied upon by the examiner as support for the rejection. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the brief along with the examiner's rationale in support of the rejection and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the obviousness of the invention as set forth in claims 1-10. Accordingly, we reverse.

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to

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modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See Id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976). Only those arguments actually made by appellants have been considered in this

decision. Arguments which appellants could have made but chose not to make in the brief have not been considered [see 37 CFR § 1.192(a)].

The examiner's rejection is set forth on pages 3-4 of the answer. With respect to independent claims 1 and 10, appellants argue that none of the references teach the use of a nitride plug to control the shape of a trench corner as recited in these claims. Specifically, appellants argue that Koike does not disclose any process or structure which limits the oxidation of the corner of the deep trench as claimed. Appellants also argue that although Fulton is cited to teach that an oxide can be substituted for a polysilicon which is oxidized, Fulton clearly does not teach a nitride plug which limits oxidation to control the shape of the corner of the trench as claimed. Finally, appellants argue that even though Gardner teaches the use of nitride spacers, Gardner does not teach or suggest a nitride plug which controls the shape of the trench corner as claimed. Appellants argue that the invention does not result from a mere substitution of materials as alleged by the examiner because the prior art does not teach or suggest the use of any type of plug regardless of the material used [brief, pages 8-12].

The examiner responds that the nitride spacers of Gardner are essentially nitride plugs as claimed. The examiner asserts that Gardner suggests substituting nitride or oxynitride for the oxide used by Koike for rounding the trench corner. The examiner finds that the oxide material of Koike acts as a plug and that it would have been obvious to replace the oxide "plug" of Koike with a nitride plug as taught by Gardner. The examiner also notes that there is no evidence that a nitride plug is superior to an oxide plug [answer, pages 6-8].

We agree with the position argued by appellants because the rejection fails to establish a prima facie case of obviousness. We do not agree with the examiner's critical finding that the oxide layer of Koike forms an oxide plug in the same manner as the claimed invention recites a nitride plug. As argued by appellants, the oxide layer in Koike simply fills the recessed areas with the oxide layer, but that process does not constitute filling the recess with a plug as that term is normally used. We also agree with appellants that the collective teachings of the applied prior art would not have suggested to the artisan the obviousness of replacing the oxide layer of Koike with nitride plugs as claimed for controlling the shape of a trench corner. We also do not agree with the examiner's finding

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that the nitride spacers of Gardner would suggest the use of
nitride plugs as recited in claims 1 and 10.

For these reasons, we do not sustain the examiner's
rejection of independent claims 1 and 10 or of claims 2-9 which
depend from claim 1. Therefore, the decision of the examiner
rejecting claims 1-10 is reversed.

REVERSED

JERRY SMITH)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
ANITA PELLMAN GROSS)	
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)	
)	INTERFERENCES
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